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This document is part of a software package that provides the capability to conformance test the Department of Defense suite of upper level protocols including: Internet Protocol (IP) Mil-Std 1777, Transmission Control Protocol (TCP) Mil-Std 1778, File Transfer Protocol (FTP) Mil-Std 1780, Simple Mail Transfer Protocol (SMTP) Mil-Std 1781 and TELNET Protocol Mil-Std 1782.

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UPPER LEVEL PROTOCOL TEST SYSTEM

INTERNET PROTOCOL MIL-STD 1777 TEST TRACEABILITY INDEX

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**PROTOCOL TEST SYSTEM
INTERNET PROTOCOL (IP)
MIL-STD-1777
TRACEABILITY MATRIX**

This Traceability Matrix provides information on the derivation, organization, and function of tests specified for IP within the Protocol Test System.

The document is divided into four sections:

**IP TRACEABILITY INDEX;
IP TEST INDEX;
IP TEST SCENARIOS INDEX;
IP SCENARIOS AND TEST DESCRIPTIONS.**

**IP TRACEABILITY INDEX: IP TEST NUMBERS VERSUS
IP MIL-STD-1777 REFERENCES . . .**

The table indicates the cross-reference between the Test Scenarios and the applicable sections in MIL-STD-1777 and RFC 792 (Internet Control Message Protocol) regarding each required function, operation, option, mode, response, or state.

**IP TEST INDEX: IP TEST NUMBERS VERSUS
IP COMMANDS/PRIMITIVES/OPTIONS/MODES . . .**

The table shows the IP Test Numbers that may be regarded as the "principle tests" of each IP Command or Primitive and Option or Mode.

**IP TEST SCENARIOS INDEX: IP TEST SCENARIO FILES VERSUS
IP TEST NUMBERS. . .**

The table shows, for each IP Test Number, the UNIX file name of the IP Test Scenario in which that number appears.

IP SCENARIOS AND TEST DESCRIPTIONS . . .

This section provides a brief narrative of the scope and objectives of each IP Test Scenario File and an operational description of each IP Test Number.

SECTION 1 - IP TRACEABILITY INDEX

IP Test Numbers Versus IP MIL-STD-1777 AND RFC 792.

The table indicates the cross-reference between the IP tests and the applicable sections of MIL-STD-1777. It also provides references to RFC 792 for details of the Internet Control Message Protocol (ICMP) protocol.

<u>Reference</u>		<u>Test Number</u>
MIL-STD-1777:		
6.2.1.1	Send Service Request	1
6.2.2.1	Deliver Service Response	1
6.3.6.1	Send Request Strict Source Routing	238-245
6.3.6.1	Send Request Parameter Problems	207, 215-217 222-229 232-237 240-245 248-253
6.3.6.1	Send Request Time to Live Satisfied	1
6.3.6.2	Deliver Time to Live Satisfied	1
6.3.6.2	Deliver Strict Source Routing Satisfied	76
6.3.6.2	Deliver Loose Source Routing Satisfied	87
6.3.6.2	Options delivered to ULP	32-100
9.2.2.2	Fragment Reassembly	18-31 42-43 61-62 74-75 85-86 96-97
9.1	Robustness - Conservative in sending - Liberal in receiving	all
9.2.3	Checksum	11
9.2.4	Time To Live	7-9 23, 28 207-208
9.2.5	Type of Service	2-6 200-206
9.2.6.1	Timestamp Option	46-63 219-229
9.3.1	Version	10

Reference

Test Number

MIL-STD-1777:

9.3.2	Header Length	12, 13
9.3.2	Total Length	13-16
9.3.3	Type of Service Parameters	2-6 200-206
9.3.3	Precedence Values	2,6,200 204-206
9.3.3	Low Delay - Acceptance	3
9.3.3	Low Delay - Setting	201
9.3.3	High Reliability - Acceptance	4
9.3.3	High Reliability - Setting	202
9.3.3	High Throughput - Acceptance	6
9.3.3	High Throughput - Setting	203
9.3.4	Total Length	1
9.3.6	Fragment Flags	17,209 18-31 42-43 61-62 74-75 85-86 96-97
9.3.7	Fragment Offset	18-31 42-43 61-62 74-75 85-86 96-97
9.3.8	Time to Live Range	9
9.3.9	Protoco' Field	25
9.3.13	Options	32-100 210-256
9.3.13.1	End of Option List option	32-34 210-212
9.3.13.1	Unspecified Option	36
9.3.15.1	No Operation and End-of-Options List Options	32-34 210-212
9.3.15.2	No Operation option	32-35 210-213
9.3.15.4	Loose Source option	87-97 246-253
9.3.15.5	Strict Source option	76-86 238-245
9.3.15.6	Record Route option	64-75 230-237

Reference

Test Number

MIL-STD-1777:

9.3.15.7	Stream Option	37-44 214-218
9.3.15.8	Timestamp Option	46-63 219-229
9.4.6.2.1	Determination if fragment	17-31 42-43 61-62 74-75 85-86 96-97
9.4.6.2.3	Checksum	11
9.4.6.2.4	ICMP Checksum	312
9.4.6.2.6	Fragment Reassembly	17-31 42-43 61-62 74-75 85-86 96-97
9.4.6.2.7	Validation of Delivered Parameters	7,8,10 12-13, 25
9.4.6.2.7	Invalid Protocol	25
9.4.6.2.7	Invalid Version Number	10
9.4.6.2.7	Header Length	12-13
9.4.6.2.8	Time to Live	7, 8
9.4.6.2.9	Validation of Outgoing Parameters	200-256
9.4.6.2.9	Validation of Send Time To Live	207-208
9.4.6.2.9	Validation of Send Option Parameters	210-256
9.4.6.3.1	Delivered ICMP messages	300,302 305, 307-316
9.4.6.3.5	Generation of ICMP messages	301 303-304 306,309 311 314-315 317
9.4.6.3.5	ICMP Checksum - Check	312
9.4.6.3.9	Fragment Reassembly	17-31 42-43 61-62 74-75 85-86 96-97

Reference

Test Number

MIL-STD-1777:

9.4.6.3.10	Reassembly of Valid Datagrams	18-22, 24,30 31,42 61,74 86,97
9.4.6.3.11	Time to Live in Reassembly	23,28 29
9.4.6.3.9	Inconsistent Fragment Parameters	25,26 27
9.4.6.3.10	More Fragments Field	17

RFC 792 ICMP

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pg 4	Destination Unreachable	300-301
pg 6	Time Exceeded	302-304
pg 8	Parameter Problem	305-306
pg 10	Source Quench	316-317
pg 12	Redirect	307
pg 14	Echo	310-311
pg 16	Timestamp	308-309
pg 18	Information	313-316

SECTION 2 - IP TEST INDEX

The table shows the IP Test Numbers that may be regarded as the "principle tests" for each IP service request, response, and option.

Test Number

Purpose

IP Tests:

1	Deliver and Send Datagram
2	Precedence Values - Acceptance
3	Low Delay - Acceptance
4	High Reliability - Acceptance
5	High Throughput - Acceptance
6	Type of Service Combinations - Acceptance
7	Illegal Time to Live - Rejection
8	Too Small Time to Live - Rejection
9	Range of Valid Time to Live Values - Acceptance
10	Invalid Version Number - Rejection
11	Invalid Checksum - Rejection
12	Illegally Small Header Length - Rejection
13	Inconsistent Header and Total Length - Rejection
14	Illegally Small Total Length - Rejection
15	Total Length Greater Than Actual Length - Rejection
16	Total Length Smaller Than Actual Length - Rejection
17	More Fragments Field - Recognition
18	Reassembly of 2-Fragment Datagram
19	Reassembly of 3-Fragment Datagram
20	Reassembly of 576-Octet Datagram
21	Reassembly of Out-of-Order Fragments - Mixed
22	Reassembly of Fragments Received in Reverse Order
23	Expired Time to Live in Arriving Fragment - Rejection
24	Duplicate Fragment in Reassembly
25	Inconsistent Protocol Fields in Fragment Reassembly - Rejection
26	Inconsistent Precedence Fields in Fragment Reassembly - Rejection
27	Inconsistent Source Fields in Fragment Reassembly - Rejection

<u>Test Number</u>	<u>Purpose</u>
28	Expiration of Time to Live during Reassembly -
	Rejection Reassembly - Rejection
29	Setting and Restarting Reassembly Timer
30	Reassembly of Two Intermixed Datagrams
31	Reassembly of Many Intermixed Datagrams
32	Datagram with NOP and End-of-Options List
	Options - Acceptance
33	Datagram with 2 NOP, 1 End-of-Options List
	Options - Acceptance
34	Datagram with 3 NOP, 1 End-of-Options List
	Options - Acceptance
35	Datagram with 4 NOP Options - Acceptance
36	Datagram with Invalid Options - Rejection
37	Stream Option - Acceptance
38	Stream Option with Invalidly Large Option
	Length - Determination of Acceptance
39	Stream Option with Invalidly Small Option
	Length - Determination of Acceptance
40	Duplicate Stream Option - Rejection
41	Stream Option without Copy Flag -
	Determination of Acceptance
42	Stream Option on Fragmented Datagram -
	Reassembly
43	Stream Option Not Present on all Fragments -
	Rejection
44	Full Range of Stream Id Values - Acceptance
46	Timestamp Option with Format 0 - Acceptance
47	Timestamp Option with Format 1 - Acceptance
48	Timestamp Option with Format 3 - Acceptance
49	Timestamp Option with Overflow - Acceptance
50	Timestamp Option with Empty value fields -
	Acceptance
51	Timestamp Option with Non-standard Timestamp -
	Acceptance
52	Timestamp Option with Standard and Non-standard
	Timestamp fields - Acceptance
53	Timestamp Option with Illegally Small Option
	Pointer - Determination of Acceptance
54	Timestamp Option with Invalid Option Ptr -
	Determination of Acceptance
55	Timestamp Option with Illegally Small Option
	Length - Determination of Acceptance
56	Timestamp Option with Illegally Large Option
	Length - Determination of Acceptance

<u>Test Number</u>	<u>Purpose</u>
57	Timestamp Option with Invalid Option Length - Determination of Acceptance
58	Timestamp Option with Copy Flag - Determination of Acceptance
59	Timestamp Option with Invalid Format - Determination of Acceptance
60	Duplicate Timestamp Option - Rejection
61	Timestamp Option on Datagram Fragments - Reassembly
62	Timestamp Option Duplicated on Datagram Fragments - Determination of Reassembly
63	Timestamp Option with Incomplete Timestamp Field - Determination of Acceptance
64	Record Route Option - Acceptance
65	Record Route Option with all Field Filled - Acceptance
66	Record Route Option with all Route Fields Not Filled - Acceptance
67	Record Route Option with Invalidly Small Option Length - Determination of Acceptance
68	Record Route Option with Invalidly Large Option Length - Determination of Acceptance
69	Record Route Option with Illegally Small Option Pointer - Determination of Acceptance
70	Record Route Option with Invalid Option Ptr - Determination of Acceptance
71	Record Route Option with Invalid Copy Flag - Determination of Acceptance
72	Duplicate Record Route Option - Rejection
73	Record Route Option with Invalid Relationship Between Length and Pointer - Determination of Acceptance
74	Record Route Option on Datagram Fragments - Reassembly
75	Record Route Option Duplicated on Datagram Fragments - Rejection
76	Strict Source Option - Acceptance
77	Strict Source Option with Multiple Record Fields - Acceptance
78	Strict Source Option with Not All Gateways Traversed - Rejection
79	Strict Source Option with Invalidly Small Option Length - Determination of Acceptance
80	Strict Source Option with Invalidly Large Option Length - Determination of Acceptance

<u>Test Number</u>	<u>Purpose</u>
81	Strict Source Option With Illegally Small Option Pointer - Determination of Acceptance
82	Strict Source Option With Invalid Option Ptr - Determination of Acceptance
83	Strict Source Option Without Copy Flag - Rejection
84	Duplicate Strict Source Option - Rejection
85	Strict Source Option Not Duplicated on all Fragments - Rejection
86	Strict Source Option Duplicated on Fragments - Reassembly
87	Loose Source Option - Acceptance
88	Loose Source Option with Multiple Record Fields - Acceptance
89	Loose Source Option with Not All Gateways Traversed - Rejection
90	Loose Source Option with Invalidly Small Option Length - Determination of Acceptance
91	Loose Source Option with Invalidly Large Option Length - Determination of Acceptance
92	Loose Source Option With Illegally Small Option Pointer - Determination of Acceptance
93	Loose Source Option With Invalid Option Ptr - Determination of Acceptance
94	Loose Source Option Without Copy Flag - Rejection
95	Duplicate Loose Source Option - Rejection
96	Loose Source Option Not Duplicated on all Fragments - Rejection
97	Loose Source Option Duplicated on Fragments - Reassembly
98	2 Options on Datagram, Record Route and Strict Source - Acceptance
99	3 Options on Datagram, Record Route, Loose Source and Timestamp, - Acceptance
100	4 Options on Datagram, Record Route, Strict Source, Stream and Timestamp, - Acceptance
200	Precedence - Setting of Values 0 - 3
201	Low Delay - Setting
202	High Reliability - Setting
203	High Throughput - Setting
204	Type of Service Combinations - Setting with Precedence Values 0 - 3
205	Precedence - Setting of Values 4 - 7
206	Type of Service Combinations - Setting with Precedence Values 4 - 7

<u>Test Number</u>	<u>Purpose</u>
207	Time To Live Illegally Small - Refusal to Send
208	Range of Time To Live Values - Setting
209	Don't Fragment Flag - Setting
210	1 NOP and 3 EOL options - Sending
211	2 NOP and 2 EOL options - Sending
212	3 NOP and 1 EOL options - Sending
213	4 NOP options - Sending
214	Stream Option - Sending
215	Stream Option with Illegal Option Length - Refusal to Send
216	Stream Option with Incorrect Stream ID - Refusal to Send
217	Two Stream Options - Refusal to Send
218	Range of Stream Options -Setting
219	Timestamp Option with Format 0 - Sending
220	Timestamp Option with Format 1 - Sending
221	Timestamp Option with Format 3 - Sending
222	Timestamp Option with Overflow Set - Refusal to Send
223	Timestamp Option with Illegally Small Pointer - Refusal to Send
224	Timestamp Option with Invalid Pointer - Refusal to Send
225	Timestamp Option with Illegally Small Option Length - Refusal to Send
226	Timestamp Option with Illegally Large Option Length - Refusal to Send
227	Timestamp Option with Copy Flag - Refusal to Send
228	Timestamp Option with Unassigned Format Code - Refusal to Send
229	Two Timestamp Options - Refusal to Send
230	Record Route Option - Sending
231	Record Route Option with Multiple Record Fields - Sending
232	Record Route Option with Illegally Small Length - Refusal to Send
233	Record Route Option with Illegally Large Length - Refusal to Send
234	Record Route Option with Illegally Small Pointer - Refusal to Send
235	Record Route Option with Invalid Pointer - Refusal to Send
236	Record Route Option With Invalid Copy Flag - Refusal to Send

<u>Test Number</u>	<u>Purpose</u>
237	Two Record Route Options - Refusal to Send
238	Strict Source Record Route Option - Sending
239	Strict Source Option with Multiple Fields - Sending
240	Strict Source Option with Illegally Small Option Length - Refusal to Send
241	Strict Source Option with Invalidly Large Option Length - Refusal to Send
242	Strict Source Option with Illegal Small Pointer Value - Refusal to Send
243	Strict Source Option with Invalid Strict Source Pointer Value - Refusal to Send
244	Strict Source Option with No Copy Flag - Refusal to Send
245	Two Strict Source Options - Refusal to Send
246	Loose Source Record Route Option - Sending
247	Loose Source Option with Multiple Fields - Sending
248	Loose Source Option with Illegally Small Option Length - Refusal to Send
249	Loose Source Option with Invalidly Large Option Length - Refusal to Send
250	Loose Source Option with Illegal Small Pointer Value - Refusal to Send
251	Loose Source Option with Invalid Strict Source Pointer Value - Refusal to Send
252	Loose Source Option with No Copy Flag - Refusal to Send
253	Two Loose Source Options - Refusal to Send
254	Two Different Options - Sending
255	Three Different Options - Sending
256	Multiple Options - Sending
300	ICMP Destination Unreachable - Acceptance
301	ICMP Destination Unreachable - Sending
302	ICMP Time Exceeded - Acceptance
303	ICMP Time Exceeded - Sending
304	ICMP Time Exceeded in Reassembly - Sending
305	ICMP Parameter Problem - Acceptance
306	ICMP Parameter Problem - Sending
307	ICMP Redirect- Acceptance
308	ICMP Timestamp Response - Acceptance
309	ICMP Timestamp Request/Reply - Acceptance of Request, Sending of Reply

<u>Test Number</u>	<u>Purpose</u>
310	ICMP Echo Reply - Acceptance
311	ICMP Echo Request/Reply - Acceptance of Request, Sending of Reply
312	ICMP Invalid Checksum - Refusal to Accept
313	ICMP Information Reply - Acceptance
314	ICMP Information Request/Reply - Acceptance of Request, Sending of Reply
315	ICMP Information Request/Reply for Network Address - Acceptance of Request, Sending of Reply
316	ICMP Source Quench - Acceptance
317	ICMP Source Quench - Sending

SECTION 3 - IP TEST SCENARIOS INDEX

The table shows, for each IP Test Number, the UNIX file name of the IP Scenario File in which it appears.

<u>Test Number</u>	<u>Scenario Name</u>
1	IP_BASIC
2	IP_BASIC
3	IP_BASIC
4	IP_BASIC
5	IP_BASIC
6	IP_BASIC
7	IP_BASIC
8	IP_BASIC
9	IP_BASIC
10	IP_BASIC
11	IP_BASIC
12	IP_BASIC
13	IP_BASIC
14	IP_BASIC
15	IP_BASIC
16	IP_BASIC
17	IP_BASIC
18	IP_FRAGMENTS
19	IP_FRAGMENTS
20	IP_FRAGMENTS
21	IP_FRAGMENTS
22	IP_FRAGMENTS
23	IP_FRAGMENTS
24	IP_FRAGMENTS
25	IP_FRAGMENTS
26	IP_FRAGMENTS
27	IP_FRAGMENTS
28	IP_EXTEND
29	IP_EXTEND
30	IP_EXTEND
31	IP_EXTEND
32	IP_NOP
33	IP_NOP
34	IP_NOP
35	IP_NOP
36	IP_NOP
37	IP_STREAMOPT
38	IP_STREAMOPT
39	IP_STREAMOPT

Test Number

Scenario Name

40	IP_STREAMOPT
41	IP_STREAMOPT
42	IP_STREAMOPT
43	IP_STREAMOPT
44	IP_STREAMOPT
46	IP_TIMESTAMP1
47	IP_TIMESTAMP1
48	IP_TIMESTAMP1
49	IP_TIMESTAMP1
50	IP_TIMESTAMP1
51	IP_TIMESTAMP1
52	IP_TIMESTAMP1
53	IP_TIMESTAMP1
54	IP_TIMESTAMP1
55	IP_TIMESTAMP1
56	IP_TIMESTAMP2
57	IP_TIMESTAMP2
58	IP_TIMESTAMP2
59	IP_TIMESTAMP2
60	IP_TIMESTAMP2
61	IP_TIMESTAMP2
62	IP_TIMESTAMP2
63	IP_TIMESTAMP2
64	IP_RECROUTE
65	IP_RECROUTE
66	IP_RECROUTE
67	IP_RECROUTE
68	IP_RECROUTE
69	IP_RECROUTE
70	IP_RECROUTE
71	IP_RECROUTE
72	IP_RECROUTE
73	IP_RECROUTE
74	IP_RECROUTE
75	IP_RECROUTE
76	IP_STRICTSR
77	IP_STRICTSR
78	IP_STRICTSR
79	IP_STRICTSR
80	IP_STRICTSR
81	IP_STRICTSR
82	IP_STRICTSR
83	IP_STRICTSR
84	IP_STRICTSR
85	IP_STRICTSR
86	IP_STRICTSR

Test Number

Scenario Name

87	IP_LOOSESER
88	IP_LOOSESER
89	IP_LOOSESER
90	IP_LOOSESER
91	IP_LOOSESER
92	IP_LOOSESER
93	IP_LOOSESER
94	IP_LOOSESER
95	IP_LOOSESER
96	IP_LOOSESER
97	IP_LOOSESER
98	IP_OPTIONS
99	IP_OPTIONS
100	IP_OPTIONS
200	TOPDOWN_BASIC1
201	TOPDOWN_BASIC1
202	TOPDOWN_BASIC1
203	TOPDOWN_BASIC1
204	TOPDOWN_BASIC1
205	TOPDOWN_BASIC2
206	TOPDOWN_BASIC2
207	TOPDOWN_BASIC2
208	TOPDOWN_BASIC2
209	TOPDOWN_BASIC2
210	TOPDOWN_NOP
211	TOPDOWN_NOP
212	TOPDOWN_NOP
213	TOPDOWN_NOP
214	TOPDOWN_STREAMOPT
215	TOPDOWN_STREAMOPT
216	TOPDOWN_STREAMOPT
217	TOPDOWN_STREAMOPT
218	TOPDOWN_STREAMOPT
219	TOPDOWN_TIMESTAMP
220	TOPDOWN_TIMESTAMP
221	TOPDOWN_TIMESTAMP
222	TOPDOWN_TIMESTAMP
223	TOPDOWN_TIMESTAMP
224	TOPDOWN_TIMESTAMP
225	TOPDOWN_TIMESTAMP
226	TOPDOWN_TIMESTAMP
227	TOPDOWN_TIMESTAMP
228	TOPDOWN_TIMESTAMP
229	TOPDOWN_TIMESTAMP

Test Number

Scenario Name

230	TOPDOWN_RECROUTE
231	TOPDOWN_RECROUTE
232	TOPDOWN_RECROUTE
233	TOPDOWN_RECROUTE
234	TOPDOWN_RECROUTE
235	TOPDOWN_RECROUTE
236	TOPDOWN_RECROUTE
237	TOPDOWN_RECROUTE
238	TOPDOWN_STRICTSR
239	TOPDOWN_STRICTSR
240	TOPDOWN_STRICTSR
241	TOPDOWN_STRICTSR
242	TOPDOWN_STRICTSR
243	TOPDOWN_STRICTSR
244	TOPDOWN_STRICTSR
245	TOPDOWN_STRICTSR
246	TOPDOWN_LOOSESER
247	TOPDOWN_LOOSESER
248	TOPDOWN_LOOSESER
249	TOPDOWN_LOOSESER
250	TOPDOWN_LOOSESER
251	TOPDOWN_LOOSESER
252	TOPDOWN_LOOSESER
253	TOPDOWN_LOOSESER
254	TOPDOWN_OPTIONS
255	TOPDOWN_OPTIONS
256	TOPDOWN_OPTIONS
300	IP_ICMP
301	IP_ICMP
302	IP_ICMP
303	IP_ICMP
304	IP_ICMP
305	IP_ICMP
306	IP_ICMP
307	IP_ICMP
308	IP_ICMP
309	IP_ICMP
310	IP_ICMP
311	IP_ICMP
312	IP_ICMP
313	IP_ICMP
314	IP_ICMP
315	IP_ICMP
316	IP_ICMP
317	IP_ICMP

SECTION 4 - IP SCENARIOS AND TEST DESCRIPTIONS

This section provides a brief narrative of the scope and objectives of each IP Test Scenario file and describes individual tests in each scenario.

=====

Scenario BASIC

This scenario tests whether the Implementation Under Test (IUT) accepts all datagrams with valid header values and drops datagrams with invalid or inconsistent values.

TEST 1: CORRECT DEFAULT DATAGRAM

Determine that the IUT accepts datagram formatted with all header fields set to correct default values.

- Action: The Central Driver (CD) will send a datagram correctly set with default values to the IUT.
- Verification: The IUT should return a response datagram indicating it accepted the datagram.
- Success: The IUT returns the required response datagram.
- Failure: The IUT does not return the response datagram.

TEST 2: ACCEPTANCE OF ALL PRECEDENCE VALUES

Determine that the IUT will accept datagrams with all precedence values.

- Action: CD will send a series of datagrams to the IUT. Precedence in the datagram will vary from 0 to 7. All other values in the header will be the default values.
- Verification: The IUT should return a response datagram for each datagram sent.

- Success: The IUT returns a response datagram for every datagram sent.

- Failure: The IUT does not return a response datagram for every datagram sent.

TEST 3: ACCEPTANCE OF LOW DELAY

Determine that the IUT will accept a datagram sent with low delay.

- Action: CD will send a datagram sent with low delay to the IUT. All other values in the header will be default values.

- Verification: The IUT should return the required response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

TEST 4: ACCEPTANCE OF HIGH RELIABILITY

Determine that the IUT will accept a datagram sent with high reliability.

- Action: CD will send a datagram set with high reliability to the IUT. All other values in the header will be default values.

- Verification: The IUT should return a response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

TEST 5: ACCEPTANCE OF HIGH THROUGHPUT

Determine that the IUT accepts a datagram set with high throughput.

- Action: CD will send the IUT a datagram set with high throughput. All other values in the header will be default values.

- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

TEST 6: ACCEPTANCE OF TYPE OF SERVICE COMBINATIONS

Determine that the IUT accepts datagrams set with every combination of type of service -- precedence, delay, throughput, and reliability.

- Action: CD will send the IUT a series of datagrams set with every combination of precedence, delay, throughput, and reliability. All other values in the IP header will be default values.

- Verification: The IUT should return a response datagram for every datagram sent.

- Success: The IUT returns a response datagram for every datagram sent.

- Failure: The IUT does not return a response datagram for every datagram sent.

TEST 7: RECOGNITION OF ILLEGALLY SMALL TIME TO LIVE

Determine that the IUT drops a datagram with an illegally small time to live (time to live of 0).

- Action: CD will send the IUT a datagram with a time to live of 0. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 8: RECOGNITION OF TOO SMALL TIME TO LIVE

Determine that the IUT drops a datagram arriving with time to live of 1.

- Action: CD will send the IUT a datagram with a time to live of 1. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 9: ACCEPTANCE OF RANGE OF TIME TO LIVE VALUES

Determine that the IUT accepts datagrams set with the upper and lower bounds of valid time to live values.

- Action: CD will send the IUT a datagram with a time to live of 2. All other datagram values will be valid default values. The CD will send the IUT a second datagram with a time to live of 255. All other datagram values will be valid default values.

- Verification: The IUT should send a response datagram for each datagram.

- Success: IUT sends a response datagram for each datagram.

- Failure: The IUT does not return a response datagram for each datagram.

TEST 10: RECOGNITION OF VERSION NUMBER

Determine that the IUT drops a datagram whose header has an incorrect version number.

- Action: CD will send a datagram with a version number of 3 to the IUT. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 11: RECOGNITION OF INVALID CHECKSUM

Determine that the IUT drops a datagram with an invalid checksum.

- Action: CD will send a datagram with an invalid checksum to the IUT. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 12: RECOGNITION OF ILLEGALLY SMALL HEADER LENGTH

Determine that the IUT drops a datagram with an invalid header length.

- Action: CD will send a datagram with a header length of 4 to the IUT. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

**TEST 13: RECOGNITION OF INCONSISTENT HEADER LENGTH VS. DATAGRAM
----- TOTAL LENGTH**

Determine that the IUT drops a datagram with a header length greater than the total length of the datagram.

- Action: CD will send the IUT a datagram with a header length greater than the total length. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

**TEST 14: RECOGNITION OF ILLEGALLY SMALL TOTAL LENGTH
-----**

Determine that the IUT drops a datagram with an illegally small total length.

- Action: CD will send the IUT a datagram with a total length set smaller than the minimum header length. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

**TEST 15: RECOGNITION OF INCORRECTLY LARGE TOTAL LENGTH
-----**

Determine that the IUT recognizes and drops a datagram with a total length greater than the actual datagram length.

- Action: CD will send the IUT a datagram with a total length set greater than its actual length. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 16: RECOGNITION OF INCORRECTLY SMALL TOTAL LENGTH

Determine that the IUT recognizes and drops a datagram with a specified total length smaller than the actual datagram length.

- Action: CD will send the IUT a datagram with a total length set smaller than its actual length. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 17: RECOGNITION OF MORE FRAGMENTS FIELD

Determine that the IUT recognizes the IP header more fragments field and does not accept a datagram with that field when no other datagram with the same id follows.

- Action: CD will send the IUT a datagram with the more fragments field set. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT accepts a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

Scenario IP_FRAGMENTS

This scenario will test that the IUT can reassemble fragments of the same datagram and that the IUT checks the fields of the fragment datagrams for validity.

TEST 18: REASSEMBLY OF TWO-FRAGMENT DATAGRAM

Determine that the IUT can reassemble a datagram sent in two fragments.

- Action: CD will send the IUT a datagram divided into two fragments. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 19: REASSEMBLY OF THREE-FRAGMENT DATAGRAM

Determine that the IUT can reassemble a datagram sent in three fragments.

- Action: CD will send a datagram divided into three fragments to the IUT. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 20: REASSEMBLY OF 576-OCTET DATAGRAM

Determine that the IUT can reassemble a datagram totaling 576 octets.

- Action: CD will send the IUT a 576-octet datagram divided into five fragments. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 21: REASSEMBLY OF OUT-OF-ORDER FRAGMENTS -- MIXED

Determine that the IUT can reassemble a datagram whose fragments are sent out of order.

- Action: CD will send a datagram divided into four fragments to the IUT. The fragments will be sent out of order. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 22: REASSEMBLY OF OUT-OF-ORDER FRAGMENTS -- REVERSED

Determine that the IUT can reassemble a datagram whose fragments are sent out of order.

- Action: CD will send a datagram divided into four fragments to the IUT. The fragments will be sent in reverse order (the final fragment first). All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 23: RECOGNITION OF ARRIVING FRAGMENT'S EXPIRED TIME TO LIVE

Determine that the IUT does not reassemble a datagram with a fragment whose time to live has expired on arrival.

- Action: CD will send a datagram divided into fragments to the IUT. One fragment will have an expired time to live. All datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT should accept a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 24: REASSEMBLY WITH DUPLICATE FRAGMENTS

Determine that the IUT can reassemble a datagram when a fragment is duplicated.

- Action: CD will send a datagram divided into three fragments to the IUT. One fragment will be sent twice. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: The IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 25: CHECKING PROTOCOL FIELDS IN FRAGMENTS FOR CONSISTENCY

Determine that the IUT does not reassemble a datagram when the protocol fields of the fragments are not the same.

- Action: CD will send a datagram divided into fragments to the IUT. One fragment will have a protocol number other than the IP testing number of 255. All datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT should accept a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 26: CHECKING OF FRAGMENT PRECEDENCE FIELDS FOR CONSISTENCY

Determine that the IUT does not reassemble a datagram when the precedence fields of the fragments are not the same.

- Action: CD will send a datagram divided into fragments to the IUT. One fragment will have a different precedence. All datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT should accept a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 27: CHECKING OF FRAGMENT SOURCE FIELDS FOR CONSISTENCY

Determine that the IUT does not reassemble a datagram when the source fields of the fragments are not the same.

- Action: CD will send a datagram divided into fragments to the IUT. One fragment will have a different source. All other datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT should accept a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

Scenario IP_EXTEND

IP_EXTEND tests the IUT's ability to set and restart its reassembly timer; reassemble multiple datagrams; fragment correctly; and set the complete range of precedence values.

TEST 28: EXPIRATION OF FRAGMENT'S TIME TO LIVE DURING REASSEMBLY

Determine that the IUT does not reassemble a datagram when a fragment's time to live expires during reassembly.

- Action: CD will send the IUT a datagram divided into fragments. One fragment will be delayed; one transmitted fragment will have a short time to live of x seconds. The final fragment will be sent after x seconds. All datagram values will be valid default values.

- Verification: No response should be received from the IUT and the IUT should accept a subsequent valid datagram sent by the CD.

- Success: No response is received from the IUT and the IUT accepts the subsequent valid datagram sent by the CD.

- Failure: The IUT returns a response datagram.

TEST 29: SET AND RESTART THE REASSEMBLY TIMER

Determine that the IUT sets and restarts the reassembly timer as the time to live values of the incoming datagram fragments dictate.

- Action: The CD determines that the IUT checks the time to live in a fragment. The CD will send a datagram divided into fragments. One fragment will be delayed. One of the first fragments sent will have a time to live of x. A following fragment will have a time of x+y. The delayed fragment will not be sent until x seconds have passed. All datagram values will be valid.

- Verification: The IUT should send a response datagram for the datagram.

- Success: The IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 30: REASSEMBLY OF TWO INTERMIXED DATAGRAMS

Determine that the IUT can correctly reassemble more than one datagram concurrently.

- Action: The CD will send two fragmented datagrams to the IUT. Fragments from the two datagrams will be intermixed.

- Verification: The IUT should send a response datagram for the datagram.

- Success: The IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 31: REASSEMBLY OF MULTI-INTERMIXED DATAGRAMS

Determine that the IUT can correctly reassemble many datagrams concurrently.

- Action: The CD will send more than one fragmented datagrams to the IUT. Fragments from the datagrams will be intermixed.

- Verification: The IUT should send response datagrams for the datagrams.

- Success: The IUT sends response datagrams for the datagram.

- Failure: The IUT does not return response datagrams for the datagrams.

Scenario IP_NOP

IP_NOP tests the IUT's ability to accept the No Operation option (NOP) and the End of Option List (EOL) option. This scenario tests these options as they might be used to pad the header to reach the 32 bit boundary.

TEST 32: ACCEPTANCE OF DATAGRAM WITH ONE OPTION

Determine that the IUT accepts a datagram set with an option.

- Action: CD will send the IUT a datagram with one NOP and three EOL options. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 33: ACCEPTANCE OF DATAGRAM WITH TWO OPTIONS

Determine that the IUT accepts a datagram set with two No Operation options.

- Action: CD will send a datagram with two NOP options to the IUT and two EOL options. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 34: ACCEPTANCE OF DATAGRAM WITH THREE OPTIONS

Determine that the IUT accepts datagram set with three NOP options and one EOL option.

- Action: CD will send a datagram with three NOP options and one EOL option to the IUT. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 35: ACCEPTANCE OF DATAGRAM WITH FOUR OPTIONS

Determine that the IUT accepts a datagram set with four NOP options.

- Action: CD will send a datagram with four NOP options to the IUT. All datagram values will be valid default values.

- Verification: The IUT should send a response datagram for the datagram.

- Success: IUT sends a response datagram for the datagram.

- Failure: The IUT does not return a response datagram for the datagram.

TEST 36: RECOGNITION OF DATAGRAM WITH UNSPECIFIED OPTION

Determine that the IUT accepts a datagram set with an option not specified in MIL-STD-1777.

- Action: CD will send a datagram with an unspecified option to the IUT. All other datagram values will be valid default values.

- Verification: The IUT should not send a response datagram for the datagram.

- Success: IUT does not send a response datagram for the datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram for the datagram.

Scenario IP_STREAMOPT

This scenario tests whether the Implementation Under Test (IUT) accepts datagrams with correct stream options and determines whether it drops or accepts datagrams with incorrectly formatted stream options.

TEST 37: ACCEPTANCE OF STREAM OPTION

Determine that the IUT will accept a datagram containing a valid stream option.

- Action: The Central Driver (CD) will send a datagram containing one stream option. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

**TEST 38: RECOGNITION OF STREAM OPTION WITH INVALID LARGE
OPTION LENGTH**

Determine if the IUT will accept a datagram containing a stream option with an invalidly large option length.

- Action: The Central Driver (CD) will send a datagram containing one stream option with an invalid large option length (greater than 4). All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 39: RECOGNITION OF STREAM OPTION WITH INVALIDLY SMALL
----- OPTION LENGTH**

Determine if the IUT will accept a datagram containing a stream option with an invalidly small option length.

- Action: The Central Driver (CD) will send a datagram containing one stream option with an option length of 3. All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram.

**TEST 40: RECOGNITION OF INVALID DUPLICATE STREAM
----- OPTION**

Determine if the IUT will accept a datagram containing a duplicate stream option.

- Action: The Central Driver (CD) will send a datagram containing two valid stream options.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does return a response datagram.

**TEST 41: RECOGNITION OF STREAM OPTION WITH NO COPY FLAG
-----**

Determine if the IUT will accept a datagram containing a stream option with no copy flag set on the option type.

- Action: The Central Driver (CD) will send a datagram containing one stream option without a copy flag. All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

TEST 42: REASSEMBLY OF DATAGRAM WITH STREAM OPTION

Determine if the IUT will reassemble a fragmented datagram which contains the stream option.

- Action: The Central Driver (CD) will send a datagram in fragments, all of which will carry the stream option. All datagram fields will be correct.
- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

TEST 43: RECOGNITION OF DATAGRAM WITH STREAM OPTION

NOT PRESENT ON ALL FRAGMENTS

Determine if the IUT will reassemble a fragmented datagram which does not contain the stream option on all fragments.

- Action: The Central Driver (CD) will send a datagram in fragments, not all of which will have the stream option on them. All other datagram fields will be correct.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does return a response datagram.

TEST 44: ACCEPTANCE OF FULL RANGE OF STREAM ID VALUES

Determine if the IUT will accept datagrams which contain the stream option with a full range of id values.

- Action: The Central Driver (CD) will send four datagrams to the IUT. The stream option id in these datagrams will require that different bit patterns be set in the id field. All datagram fields will be correct.

- Verification: The IUT should return a response datagram for each datagram sent.

- Success: The IUT returns a response datagram for each datagram sent.

- Failure: The IUT does not return a response datagram for each datagram sent.

Scenario IP_TIMESTAMP1

This scenario tests whether the Implementation Under Test (IUT) accepts datagrams with correct timestamp options and whether it drops or accepts datagrams with incorrectly formatted timestamp options.

TEST 46: ACCEPTANCE OF TIMESTAMP OPTION WITH FORMAT 0

Determine that the IUT will accept a datagram containing a valid timestamp option with format 0.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option of format 0. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

TEST 47: ACCEPTANCE OF TIMESTAMP OPTION WITH FORMAT 1

Determine that the IUT will accept a datagram containing a valid timestamp option of format 1, timestamp preceded by addresss of entering entity.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option of format 1 with the address and timestamp fields filled. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

TEST 48 ACCEPTANCE OF TIMESTAMP OPTION WITH FORMAT 3

Determine that the IUT will accept a datagram containing a valid timestamp option of format 3 with more than one timestamp field.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option with two timestamp-address combinations. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

TEST 49: ACCEPTANCE OF TIMESTAMP OPTION WHEN OVERFLOW FIELD USED

Determine if the IUT will accept a datagram containing a timestamp option with the overflow field set.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option of format 0 with the timestamp field filled and the overflow counter used. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

TEST 50: ACCEPTANCE OF TIMESTAMP OPTION WHEN ALL PROVIDED FIELDS NOT USED

Determine if the IUT will accept a datagram containing a timestamp option with timestamp fields still left blank.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option of format 0 with room for two timestamps. Only one timestamp field will be filled. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

**TEST 51: ACCEPTANCE OF TIMESTAMP OPTION WHEN NON-STANDARD
----- TIMESTAMP INDICATED**

Determine if the IUT will accept a datagram containing a timestamp option when the timestamp is non-standard.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option of format 0. The timestamp field will be filled with a timestamp indicating it is non-standard. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

**TEST 52: ACCEPTANCE OF TIMESTAMP OPTION WHEN NON-STANDARD
----- TIMESTAMP AND STANDARD TIMESTAMP IN OPTION FIELDS**

Determine if the IUT will accept a datagram containing a timestamp option with non-standard and standard timestamps.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option of format 0. The timestamp field will be filled with a timestamp indicating it is non-standard and a standard timestamp. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

**TEST 53: RECOGNITION OF TIMESTAMP OPTION WITH ILLEGALLY
----- SMALL OPTION POINTER**

Determine if the IUT will accept a datagram containing a timestamp option with an option pointer less than the legal smallest value.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option with an option pointer less than 5. All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 54: RECOGNITION OF TIMESTAMP OPTION WITH INVALID
----- OPTION POINTER**

Determine if the IUT will accept a datagram containing a timestamp option with an invalid length option pointer.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option with an invalid option pointer (not a multiple of $5 + 4n$ where n is a multiple of the number of timestamp fields). All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 55: RECOGNITION OF TIMESTAMP OPTION WITH ILLEGALLY
----- SMALL OPTION LENGTH**

Determine if the IUT will accept a datagram containing a timestamp option with an invalid option length.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option with an invalid length (length less than 5). All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

Scenario IP_TIMESTAMP2

This scenario is a continuation of IP_TIMESTAMP1. It tests whether the Implementation Under Test (IUT) accepts datagrams with correct timestamp options and whether it drops or accepts datagrams with incorrectly formatted timestamp options.

TEST 56: RECOGNITION OF TIMESTAMP OPTION WITH ILLEGALLY ----- LARGE OPTION LENGTH

Determine if the IUT will accept a datagram containing a timestamp option with an illegally large option length.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option with an invalid length (length greater than 40). All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram.

TEST 57: RECOGNITION OF TIMESTAMP OPTION WITH INVALID ----- OPTION LENGTH

Determine if the IUT will accept a datagram containing a timestamp option with a invalid option length.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option with an invalid length (length not a multiple of timestamp field plus 5). All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

TEST 58: RECOGNITION OF COPY FLAG ON TIMESTAMP OPTION

Determine if the IUT will accept a datagram containing a copy flag on the timestamp option.

- Action: The Central Driver (CD) will send a datagram containing a timestamp option with a copy flag.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

TEST 59: RECOGNITION OF INVALID TIMESTAMP FORMAT

Determine if the IUT will accept a datagram containing an invalid timestamp format.

- Action: The Central Driver (CD) will send a datagram containing a timestamp option with a format of 2.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 60: RECOGNITION OF INVALID DUPLICATE TIMESTAMP
----- OPTION**

Determine if the IUT will accept a datagram containing a duplicate timestamp option.

- Action: The Central Driver (CD) will send a datagram containing two valid timestamp options.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does return a response datagram.

**TEST 61: REASSEMBLY OF DATAGRAM WITH TIMESTAMP OPTION
-----**

Determine if the IUT will reassemble a fragmented datagram which contains the timestamp option.

- Action: The Central Driver (CD) will send a datagram in fragments, only one of which will have the timestamp option on it. All datagram fields will be correct.

- Verification: The IUT should return a response datagram.

- Success: The IUT does return a response datagram.

- Failure: The IUT does not return a response datagram.

**TEST 62: RECOGNITION OF DATAGRAM WITH TIMESTAMP OPTION
----- DUPLICATED ON FRAGMENTS**

Determine if the IUT will drop a fragmented datagram which contains the timestamp option on all fragments.

- Action: The Central Driver (CD) will send a datagram in fragments, all of which will have the timestamp option on them. All other datagram fields will be correct.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram.

TEST 63: RECOGNITION OF DATAGRAM WITH TIMESTAMP OPTION
----- TOO SHORT TO ALLOW COMPLETE TIMESTAMP FIELD

Determine if the IUT will drop a fragmented datagram which contains a timestamp option too short for timestamp-address.

- Action: The Central Driver (CD) will send a datagram of format 1. There will not be enough room to place the complete timestamp and address in the option. All other datagram fields will be correct.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram.

Scenario IP_RECROUTE

This scenario tests whether the Implementation Under Test (IUT) accepts datagrams with correct record route options and whether it drops or accepts datagrams with incorrectly formatted record route options.

TEST 64: ACCEPTANCE OF RECORD ROUTE OPTION

Determine that the IUT will accept a datagram containing a valid record route option.

- Action: The Central Driver (CD) will send a datagram containing one record route option. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

TEST 65: ACCEPTANCE OF RECORD ROUTE OPTION WITH ROUTE FIELDS FILLED

Determine that the IUT will accept a datagram containing a valid record route option with its route fields filled with addresses.

- Action: The Central Driver (CD) will send a datagram containing one record route option with the route fields filled. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

**TEST 66: ACCEPTANCE OF RECORD ROUTE OPTION WITH ROUTE FIELDS
----- NOT FILLED**

Determine that the IUT will accept a datagram containing a valid record route option with some of its route fields empty.

- Action: The Central Driver (CD) will send a datagram containing one record route option with not all route fields filled. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

**TEST 67: RECOGNITION OF RECORD ROUTE OPTION WITH INVALIDLY SMALL
----- OPTION LENGTH**

Determine if the IUT will accept a datagram containing a record route option with an invalidly small option length.

- Action: The Central Driver (CD) will send a datagram containing one record route option with an option length of 3. All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 68: RECOGNITION OF RECORD ROUTE OPTION WITH INVALID LARGE
----- OPTION LENGTH**

Determine if the IUT will accept a datagram containing a record route option with an invalidly large option length.

- Action: The Central Driver (CD) will send a datagram containing one record route option with an invalidly large option length (not equal to $3 + 4n$ where n is number of routes). All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 69: RECOGNITION OF RECORD ROUTE OPTION WITH ILLEGALLY SMALL
----- OPTION POINTER**

Determine if the IUT will accept a datagram containing a record route option with an option pointer less than legal smallest value.

- Action: The Central Driver (CD) will send a datagram containing one record route option with an invalid option pointer of 3. All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 70: RECOGNITION OF RECORD ROUTE OPTION WITH INVALID
----- OPTION POINTER**

Determine if the IUT will accept a datagram containing a record route option with an invalid length option pointer.

- Action: The Central Driver (CD) will send a datagram containing one record route option with an invalid option pointer (not a multiple of $3 + 4n$ where n is a multiple of the number of routes). All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 71: RECOGNITION OF INVALID COPY FLAG ON RECORD ROUTE
----- OPTION**

Determine if the IUT will accept a datagram containing an invalid copy flag on the record route option.

- Action: The Central Driver (CD) will send a datagram containing a record route option with an invalid copy flag.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram.

**TEST 72: RECOGNITION OF INVALID DUPLICATE RECORD ROUTE
----- OPTION**

Determine if the IUT will accept a datagram containing a duplicate record route option.

- Action: The Central Driver (CD) will send a datagram containing two valid record route options.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does return a response datagram.

**TEST 73: RECOGNITION OF INVALID RELATIONSHIP BETWEEN RECORD
----- ROUTE POINTER AND OPTION LENGTH**

Determine if the IUT will accept a datagram containing an invalid relationship between the option length and the pointer value.

- Action: The Central Driver (CD) will send a datagram containing a record route option which has a correct pointer value but an invalid record route length.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does return a response datagram.

TEST 74: REASSEMBLY OF DATAGRAM WITH RECORD ROUTE OPTION

Determine if the IUT will reassemble a fragmented datagram which contains the record route option.

- Action: The Central Driver (CD) will send a datagram in fragments, only one of which will have the record route option on it. All datagram fields will be correct.
- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

**TEST 75: RECOGNITION OF DATAGRAM WITH RECORD ROUTE OPTION
INCORRECTLY DUPLICATED ON FRAGMENTS**

Determine if the IUT will reassemble a fragmented datagram which contains the record route option on all fragments.

- Action: The Central Driver (CD) will send a datagram in fragments, all of which will have the record route option on them. All other datagram fields will be correct.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

Scenario IP_STRICTSR

This scenario tests whether the Implementation Under Test (IUT) accepts datagrams with correct strict source options and whether it drops or accepts datagrams with incorrectly formatted strict source options.

TEST 76: ACCEPTANCE OF STRICT SOURCE OPTION

Determine that the IUT will accept a datagram containing a valid strict source option.

- Action: The Central Driver (CD) will send a datagram containing one strict source option. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

**TEST 77: ACCEPTANCE OF STRICT SOURCE OPTION WITH MULTIPLE RECORD
FIELDS**

Determine that the IUT will accept a datagram containing a valid strict source option with its route fields filled with addresses.

- Action: The Central Driver (CD) will send a datagram containing one strict source option with the route fields filled. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

**TEST 78: RECOGNITION OF STRICT SOURCE OPTION WITH NOT ALL
----- GATEWAYS TRAVERSED**

Determine that the IUT will not accept a datagram containing a valid strict source option with not all gateways traversed.

- Action: The Central Driver (CD) will send a datagram containing one strict source option with not all route fields filled. All datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT returns a response datagram.

**TEST 79: RECOGNITION OF STRICT SOURCE OPTION WITH INVALIDLY
----- SMALL OPTION LENGTH**

Determine if the IUT will accept a datagram containing a strict source option with an invalidly small option length.

- Action: The Central Driver (CD) will send a datagram containing one strict source option with an option length of 3. All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram.

**TEST 80: RECOGNITION OF STRICT SOURCE OPTION WITH INVALIDLY
----- LARGE OPTION LENGTH**

Determine if the IUT will accept a datagram containing a strict source option with an invalidly large option length.

- Action: The Central Driver (CD) will send a datagram containing one strict source option with an invalidly large option length (not equal to $3 + 4n$ where n is number of routes). All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 81: RECOGNITION OF STRICT SOURCE OPTION WITH ILLEGALLY
----- SMALL OPTION POINTER**

Determine if the IUT will accept a datagram containing a strict source option with an option pointer less than legal smallest value.

- Action: The Central Driver (CD) will send a datagram containing one strict source option with an invalid option pointer of 3. All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 82: RECOGNITION OF STRICT SOURCE OPTION WITH INVALID
----- OPTION POINTER**

Determine if the IUT will accept a datagram containing a strict source option with an invalid length option pointer.

- Action: The Central Driver (CD) will send a datagram containing one strict source option with an invalid option pointer (not a multiple of 3 + 4n where n is a multiple of the number of routes). All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 83: RECOGNITION OF LACK OF COPY FLAG ON STRICT SOURCE
----- OPTION**

Determine if the IUT will accept a datagram containing no copy flag on the strict source option.

- Action: The Central Driver (CD) will send a datagram containing a strict source option with no copy flag.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 84: RECOGNITION OF INVALID DUPLICATE STRICT SOURCE
----- OPTION**

Determine if the IUT will accept a datagram containing a duplicate strict source option.

- Action: The Central Driver (CD) will send a datagram containing two valid strict source options.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does return a response datagram.

**TEST 85: REASSEMBLY OF DATAGRAM WITH STRICT SOURCE OPTION
----- NOT SENT ON ALL FRAGMENTS**

Determine if the IUT will reassemble a fragmented datagram which does not contain the strict source option on all fragments.

- Action: The Central Driver (CD) will send a datagram in fragments, only one of which will have the strict source option on it. All other datagram fields will be correct.
- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does return a response datagram.

TEST 86: RECOGNITION OF DATAGRAM WITH STRICT SOURCE OPTION
----- CORRECTLY DUPLICATED ON FRAGMENTS

Determine if the IUT will reassemble a fragmented datagram which contains the strict source option on all fragments.

- Action: The Central Driver (CD) will send a datagram in fragments, all of which will have the strict source option on them. All other datagram fields will be correct.

- Verification: The IUT should return a response datagram.
- Success: The IUT does return a response datagram.
- Failure: The IUT does not return a response datagram.

Scenario IP_LOOSESR

This scenario tests whether the Implementation Under Test (IUT) accepts datagrams with correct loose source options and whether it drops or accepts datagrams with incorrectly formatted loose source options.

TEST 87: ACCEPTANCE OF LOOSE SOURCE OPTION

Determine that the IUT will accept a datagram containing a valid loose source option.

- Action: The Central Driver (CD) will send a datagram containing one loose source option. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

TEST 88: ACCEPTANCE OF LOOSE SOURCE OPTION WITH MULTIPLE RECORD FIELDS

Determine that the IUT will accept a datagram containing a valid loose source option with its route fields filled with addresses.

- Action: The Central Driver (CD) will send a datagram containing one loose source option with the route fields filled. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram.

**TEST 89 RECOGNITION OF LOOSE SOURCE OPTION WITH NOT ALL
----- GATEWAYS TRAVERSED**

Determine that the IUT will not accept a datagram containing a valid loose source option with not all gateways traversed.

- Action: The Central Driver (CD) will send a datagram containing one loose source option with not all route fields filled. All datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT returns a response datagram.

**TEST 90: RECOGNITION OF LOOSE SOURCE OPTION WITH INVALIDLY
----- SMALL OPTION LENGTH**

Determine if the IUT will accept a datagram containing a loose source option with an invalidly small option length.

- Action: The Central Driver (CD) will send a datagram containing one loose source option with an option length of 3. All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.

- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

- Observation: The IUT does return a response datagram.

**TEST 91: RECOGNITION OF LOOSE SOURCE OPTION WITH INVALIDLY
----- LARGE OPTION LENGTH**

Determine if the IUT will accept a datagram containing a loose source option with an invalidly large option length.

- Action: The Central Driver (CD) will send a datagram containing one loose source option with an invalidly large option length (not equal to $3 + 4n$ where n is number of routes). All other datagram fields will be valid fields.

- Verification: The IUT should not return a response datagram.

- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 92: RECOGNITION OF LOOSE SOURCE OPTION WITH ILLEGALLY
----- SMALL OPTION POINTER**

Determine if the IUT will accept a datagram containing a loose source option with an option pointer less than legal smallest value.

- Action: The Central Driver (CD) will send a datagram containing one loose source option with an invalid option pointer of 3. All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.
- Observation: The IUT does return a response datagram.

**TEST 93: RECOGNITION OF LOOSE SOURCE OPTION WITH INVALID
----- OPTION POINTER**

Determine if the IUT will accept a datagram containing a loose source option with an invalid length option pointer.

- Action: The Central Driver (CD) will send a datagram containing one loose source option with an invalid option pointer (not a multiple of $3 + 4n$ where n is a multiple of the number of routes). All other datagram fields will be valid fields.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Observation: The IUT does return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

**TEST 94: RECOGNITION OF LACK OF COPY FLAG ON LOOSE SOURCE
----- OPTION**

Determine if the IUT will accept a datagram containing no copy flag on the loose source option.

- Action: The Central Driver (CD) will send a datagram containing a loose source option with no copy flag.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Observation: The IUT does return a response datagram.
- Failure: The IUT does not accept a subsequent correct datagram after not responding to the datagram with the incorrect option field.

**TEST 95: RECOGNITION OF INVALID DUPLICATE LOOSE SOURCE
----- OPTION**

Determine if the IUT will accept a datagram containing a duplicate loose source option.

- Action: The Central Driver (CD) will send a datagram containing two valid loose source options.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does return a response datagram.

**TEST 96: REASSEMBLY OF DATAGRAM WITH LOOSE SOURCE OPTION
----- NOT SENT ON ALL FRAGMENTS**

Determine if the IUT will reassemble a fragmented datagram which does not contain the loose source option on all fragments.

- Action: The Central Driver (CD) will send a datagram in fragments, only one of which will have the loose source option on it. All other datagram fields will be correct.
- Verification: The IUT should not return a response datagram.
- Success: The IUT does not return a response datagram.
- Failure: The IUT does return a response datagram.

TEST 97: RECOGNITION OF DATAGRAM WITH LOOSE SOURCE OPTION
----- CORRECTLY DUPLICATED ON FRAGMENTS

Determine if the IUT will reassemble a fragmented datagram which contains the loose source option on all fragments.

- Action: The Central Driver (CD) will send a datagram in fragments, all of which will have the loose source option on them. All other datagram fields will be correct.

- Verification: The IUT should return a response datagram.

- Success: The IUT does return a response datagram.

- Failure: The IUT does not return a response datagram.

Scenario IP_OPTIONS

This scenario tests whether the Implementation Under Test (IUT) accepts a combination of different valid options.

TEST 98: ACCEPTANCE OF RECORD ROUTE AND STRICT SOURCE OPTIONS

Determine that the IUT will accept a datagram containing a record route and a strict source record route option.

- Action: The Central Driver (CD) will send a datagram containing one record route option and one strict source record route option. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

TEST 99: ACCEPTANCE OF RECORD ROUTE, LOOSE SOURCE and TIMESTAMP OPTIONS

Determine that the IUT will accept a datagram containing a record route, loose source record route and timestamp options.

- Action: The Central Driver (CD) will send a datagram containing one record route option, one loose source record route option and one timestamp option. All datagram fields will be valid fields.
- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

**TEST 100: ACCEPTANCE OF RECORD ROUTE, STRICT SOURCE, STREAM, AND
----- TIMESTAMP OPTIONS**

Determine that the IUT will accept a datagram containing a record route, strict source record route, stream, and timestamp options.

- Action: The Central Driver (CD) will send a datagram containing one record route option, one loose source record route option and one timestamp option. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram.
- Success: The IUT returns a response datagram.
- Failure: The IUT does not return a response datagram.

SCENARIO TOPDOWN_BASIC1

This scenario tests that the IUT can set valid type of service values in the IP header. This scenario deals only with setting precedence from 0-3.

TEST 200: SETTING OF PRECEDENCE VALUES 0-3

Determine that the IUT will send datagrams with precedence values of 0, 1, 2, and 3.

- Action: CD will ask IUT to send a series of datagrams to the REF. Precedence in the datagram will vary from 0 to 3. All other values in the header will be the default values.

- Verification: The IUT should send the requested datagrams.

- Success: The IUT returns a response datagram for every datagram sent with the correct precedence or the message "notimpl".

- Failure: The IUT does not return a correct response datagram for every datagram sent.

TEST 201: SETTING OF LOW DELAY

Determine that the IUT will send a datagram with low delay.

- Action: CD will request the IUT to send a datagram with low delay to the REF. All other values in the header will be default values.

- Verification: The IUT should send the requested datagram.

- Success: The IUT returns a response datagram with the correct delay or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 202: SETTING OF HIGH RELIABILITY

Determine that the IUT will send a datagram with high reliability.

- Action: CD will request the IUT to send a datagram set with high reliability to the REF. All other values in the header will be default values.

- Verification: The IUT should return a response datagram set with high reliability.

- Success: The IUT returns a response datagram set with the requested reliability or the message "notimpl".

- Failure: The IUT does not return the correct response datagram.

TEST 203: SETTING OF HIGH THROUGHPUT

Determine that the IUT can send a datagram set with high throughput.

- Action: CD will request the IUT to send the REF a datagram set with high throughput. All other values in the header will be default values.

- Verification: The IUT should return a response datagram set with high throughput.

- Success: The IUT returns a response datagram set with high throughput or containing the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 204: SETTING TYPE OF SERVICE COMBINATIONS WITH PRECEDENCE
----- VARYING FROM 0 TO 3

Determine that the IUT accepts datagrams set with every combination of type of service -- delay, throughput, reliability and precedence varying from 0 to 3.

- Action: CD will request the IUT to send the REF a series of datagrams set with every combination of precedence, delay, throughput, and reliability. All other values in the IP header will be default values.

- Verification: The IUT should return a response datagram for every datagram sent with the correct type of service set.

- Success: The IUT returns a response datagram for every datagram sent with the correct type of service set or the message "notimpl".

- Failure: The IUT does not return a correct response datagram for every datagram sent.

SCENARIO TOPDOWN_BASIC2

This scenario tests that the IUT can set valid type of service values in the IP header. This scenario deals only with setting precedence from 4-7.

TEST 205: SETTING OF PRECEDENCE VALUES 4-7

Determine that the IUT will send datagrams with precedence values of 4, 5, 6, and 7.

- Action: CD will ask IUT to send a series of datagrams to the REF. Precedence in the datagram will vary from 4 to 7. All other values in the header will be the default values.

- Verification: The IUT should send the requested datagrams.

- Success: The IUT returns a response datagram for every datagram sent with the correct precedence or the message "notimpl".

- Failure: The IUT does not return a correct response datagram for every datagram sent.

**TEST 206: SETTING TYPE OF SERVICE COMBINATIONS WITH PRECEDENCE
VARYING FROM 4 TO 7**

Determine that the IUT accepts datagrams set with every combination of type of service -- delay, throughput, reliability and precedence varying from 4 to 7.

- Action: CD will request the IUT to send the REF a series of datagrams set with every combination of precedence, delay, throughput, and reliability. All other values in the IP header will be default values.

- Verification: The IUT should return a response datagram for every datagram sent with the correct type of service set.

- Success: The IUT returns a response datagram for every datagram sent with the correct type of service set or the message "notimpl".

- Failure: The IUT does not return a correct response datagram for every datagram sent.

TEST 207: RECOGNITION OF ILLEGALLY SMALL TIME TO LIVE

Determine that the IUT refuses to send a datagram with an illegally small time to live (time to live of 0).

- Action: CD will request IUT to send the REF a datagram with a time to live of 0. All other datagram values will be valid default values.

- Verification: The IUT should not send a datagram with a time to live of 0.

- Success: The IUT sends a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns the requested datagram.

TEST 208: SETTING OF RANGE OF VALID TIME TO LIVE VALUES

Determine that the IUT can send datagrams set with the upper and lower bounds of valid time to live values.

- Action: CD will request the IUT to send a datagram with a time to live of 2. All other datagram values will be valid default values. The CD will request the IUT to send the REF a second datagram with a time to live of 255. All other datagram values will be valid default values.

- Verification: The IUT should send the requested datagram or a response datagram with the message "notimpl".

- Success: IUT sends the requested response datagram for each datagram or a datagram with the message "notimpl".

- Failure: The IUT does not return a correct response datagram for each datagram.

TEST 209: SETTING OF DON'T FRAGMENT FLAG

Determine that the IUT can set the IP header don't fragment flag.

- Action: CD will request the IUT to send a datagram with the don't fragment flag set. All datagram values will be valid default values.

- Verification: The IUT should send a datagram with the don't fragment flag set.

- Success: The datagram is received from the IUT with the don't fragment flag set or the message "notimpl".

- Failure: The IUT does not send a correct response datagram.

Scenario TOPDOWN_NOP

This scenario tests whether the Implementation Under Test (IUT) can send datagrams with the option No Operation (NOP).

TEST 210: SENDING OF ONE NOP OPTION

Determine that the IUT will send a datagram containing one valid NOP options.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing a valid NOP option to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 211: SENDING OF TWO NOP OPTIONS

Determine that the IUT will send a datagram containing two valid NOP options.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing two valid NOP options to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 212: SENDING OF THREE NOP OPTIONS

Determine that the IUT will send a datagram containing three valid NOP options.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing three valid NOP options to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 213: SENDING OF FOUR NOP OPTIONS

Determine that the IUT will send a datagram containing four valid NOP options.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing four valid NOP options to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

Scenario TOPDOWN_STREAMOPT

This scenario tests whether the Implementation Under Test (IUT) can send datagrams with correct stream options and recognizes datagrams with incorrectly formatted stream options.

TEST 214: SENDING OF STREAM OPTION

Determine that the IUT will send a datagram containing a valid stream option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one stream option to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested stream option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

**TEST 215: REFUSAL TO SEND DATAGRAM WITH ILLEGAL STREAM
OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a stream option specified with an illegal length.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one stream option specified with an option length other than 4. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested stream option.

TEST 216: REFUSAL TO SEND DATAGRAM WITH INCORRECT STREAM ID

Determine that the IUT will refuse to send a datagram containing a stream option specified with only one byte.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one stream option. The option will only have one byte of the id specified. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested stream option.

TEST 217: REFUSAL TO SEND DATAGRAM WITH TWO STREAM OPTIONS

Determine that the IUT recognizes that datagram should contain only one stream record option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing two stream options. All fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the two requested stream options.

TEST 218: SENDING FULL RANGE OF STREAM IDS IN STREAM OPTION

Determine that the IUT can send the full range of stream id values.

- Action: The Central Driver (CD) will request the IUT to send a series of datagrams containing a stream option. The stream id for the option will be chosen to set a range of valid values. All fields will be valid fields.

- Verification: The IUT should return a response datagram with the requested stream id or the message "notimpl" for every datagram requested.

- Success: The IUT does return a response datagram with the requested stream id or the message "notimpl".

- Failure: The IUT does not return a correct datagram for each requested datagram.

Scenario TOPDOWN_TIMESTAMP

This scenario tests whether the Implementation Under Test (IUT) can send datagrams with correct timestamp options and recognizes datagrams with incorrectly formatted timestamp options.

TEST 219: SENDING OF TIMESTAMP OPTION WITH FORMAT 0

Determine that the IUT will send a datagram containing a valid timestamp option specifying format 0.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one timestamp option to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested timestamp option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 220: SENDING OF TIMESTAMP OPTION WITH FORMAT 1

Determine that the IUT will send a datagram containing a valid timestamp option specifying format 1.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option using format 1. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram with the requested source routing.

- Success: The IUT returns a response datagram with the requested timestamp option or a message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 221: SENDING OF TIMESTAMP OPTION WITH FORMAT 3

Determine that the IUT will send a datagram containing a valid timestamp option specifying format 1.

- Action: The Central Driver (CD) will send a datagram containing one timestamp option using format 1. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram with the requested source routing.

- Success: The IUT returns a response datagram with the requested timestamp option or a message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 222: REFUSAL TO SEND DATAGRAM WITH OVERFLOW FIELD SET

Determine that the IUT will refuse to send a datagram containing a timestamp option specified with its overflow field already set.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one timestamp option specified with bits set in the overflow field. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested timestamp option.

**TEST 223: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY SMALL
TIMESTAMP POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a timestamp option specified with a pointer value smaller than the option legally allows.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one timestamp option specified with a pointer value less than 5. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested timestamp option.

**TEST 224: REFUSAL TO SEND DATAGRAM WITH AN INVALID TIMESTAMP
----- POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a timestamp option specified with an invalid pointer value.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one timestamp option specified with a pointer value greater than the first routing field (greater than 5). All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested timestamp option.

**TEST 225: REFUSAL TO SEND DATARAM WITH ILLEGALLY SMALL
----- TIMESTAMP OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a timestamp option specified with an illegally small length.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one timestamp option specified with an option length smaller than that legally allowed in the header. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested timestamp option.

**TEST 226: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY LARGE
----- TIMESTAMP OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a timestamp option specified with an illegally large length.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one timestamp option specified with an option length greater than that legally allowed in the header. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested timestamp option.

**TEST 227: REFUSAL TO SEND DATAGRAM WITH COPY FLAG ON TIMESTAMP
----- OPTION**

Determine that the IUT will refuse to send a datagram containing a timestamp option specified with a copy flag.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one timestamp option with the copy flag set. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested timestamp option.

**TEST 228: REFUSAL TO SEND DATAGRAM WITH UNASSIGNED TIMESTAMP
----- FORMAT CODE**

Determine that the IUT recognizes that datagram should contain only 0, 1, or 3 as timestamp format codes.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing a timestamp option with format 2. All other fields will be correct.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the two requested timestamp option.

**TEST 229: REFUSAL TO SEND DATAGRAM WITH TWO TIMESTAMP OPTIONS
-----**

Determine that the IUT recognizes that datagram should contain only one timestamp record option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing two timestamp options. All fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the two requested timestamp options.

Scenario TOPDOWN_RECROUTE

This scenario tests whether the Implementation Under Test (IUT) can send datagrams with correct record route options and recognizes datagrams with incorrectly formatted record route options.

TEST 230: SENDING OF RECORD ROUTE OPTION

Determine that the IUT will send a datagram containing a valid record route option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one record route option to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested record route option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 231: SENDING OF RECORD ROUTE OPTION WITH MULTIPLE RECORD FIELDS

Determine that the IUT will send a datagram containing a valid record route option with multiple route fields specified.

- Action: The Central Driver (CD) will send a datagram containing one record route option with many route fields. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram with the requested source routing.

- Success: The IUT returns a response datagram with the requested record route option or a message "notimpl".

- Failure: The IUT does not return a correct response datagram.

**TEST 232: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY SMALL
----- RECORD ROUTE OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a record route option specified with an illegally small length.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one record route option specified with an option length smaller than 7. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested record route option.

**TEST 233: REFUSAL TO SEND DATAGRAM WITH INVALIDLY LARGE
----- RECORD ROUTE OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a record route option specified with an option length greater than the maximum header length will allow.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one record route option specified with an option length greater than 40. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested record route option.

**TEST 234: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY SMALL
----- RECORD ROUTE POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a record route option specified with a pointer value smaller than the option legally allows.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one record route option specified with a pointer value less than 4. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested record route option.

**TEST 235: REFUSAL TO SEND DATAGRAM WITH AN INVALID RECORD
----- ROUTE POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a record route option specified with an invalid pointer value.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one record route option specified with a pointer value greater than the first routing field. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested record route option.

**TEST 236: RECOGNITION THAT RECORD ROUTE OPTION HAS NO COPY
----- FLAG**

Determine that the IUT will refuse to send a datagram containing a record route option specified with a copy flag.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one record route option specified with a copy flag. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested record route option.

TEST 237: REFUSAL TO SEND DATAGRAM WITH TWO RECORD ROUTE OPTIONS

Determine that the IUT recognizes that datagram should contain only one record route record option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing two record route options. All fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the two requested record route options.

Scenario TOPDOWN_STRICTSR

This scenario tests whether the Implementation Under Test (IUT) can send datagrams with correct strict source options and recognizes datagrams with incorrectly formatted strict source options.

TEST 238: SENDING OF STRICT SOURCE RECORD ROUTE OPTION

Determine that the IUT will send a datagram containing a valid strict source option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one strict source option to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested strict source option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 239: SENDING OF STRICT SOURCE OPTION WITH MULTIPLE RECORD FIELDS

Determine that the IUT will send a datagram containing a valid strict source option with multiple route fields specified.

- Action: The Central Driver (CD) will send a datagram containing one strict source option with many route fields. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram with the requested source routing.

- Success: The IUT returns a response datagram with the requested strict source option or a message "notimpl".

- Failure: The IUT does not return a correct response datagram.

**TEST 240: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY SMALL
----- OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a strict source option specified with an illegally small length.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one strict source option specified with an option length smaller than 7. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested strict source option.

**TEST 241: REFUSAL TO SEND DATAGRAM WITH INVALIDLY LARGE
----- STRICT SOURCE OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a strict source option specified with an option length greater than the maximum header length will allow.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one strict source option specified with an option length greater than 40. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested strict source option.

**TEST 242: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY SMALL
----- STRICT SOURCE POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a strict source option specified with a pointer value smaller than the option legally allows.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one strict source option specified with a pointer value less than 4. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested strict source option.

**TEST 243: REFUSAL TO SEND DATAGRAM WITH AN INVALID STRICT
----- SOURCE POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a strict source option specified with an invalid pointer value.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one strict source option specified with a pointer value greater than the first routing field. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested strict source option.

**TEST 244: RECOGNITION THAT STRICT SOURCE OPTION REQUIRES COPY
----- FLAG**

Determine that the IUT will refuse to send a datagram containing a strict source option specified without a copy flag.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one strict source option specified with no copy flag. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".
- Success: The IUT does return a response datagram with the message "error" or "notimpl".
- Failure: The IUT returns a response datagram with the requested strict source option.

**TEST 245: REFUSAL TO SEND DATAGRAM WITH TWO STRICT SOURCE
----- OPTIONS**

Determine that the IUT recognizes that datagram should contain only one strict source record option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing two strict source options. All fields will be valid fields.
- Verification: The IUT should return a response datagram with the message "error" or "notimpl".
- Success: The IUT does return a response datagram with the message "error" or "notimpl".
- Failure: The IUT returns a response datagram with the two requested strict source options.

Scenario TOPDOWN_LOOSESER

This scenario tests whether the Implementation Under Test (IUT) can send datagrams with correct loose source options and recognizes datagrams with incorrectly formatted loose source options.

TEST 246: SENDING OF LOOSE SOURCE RECORD ROUTE OPTION

Determine that the IUT will send a datagram containing a valid loose source option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one loose source option to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing the requested loose source option or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

TEST 247: SENDING OF LOOSE SOURCE OPTION WITH MULTIPLE RECORD FIELDS

Determine that the IUT will send a datagram containing a valid loose source option with multiple route fields specified.

- Action: The Central Driver (CD) will send a datagram containing one loose source option with many route fields. All datagram fields will be valid fields.

- Verification: The IUT should return a response datagram with the requested source routing.

- Success: The IUT returns a response datagram with the requested loose source option or a message "notimpl".

- Failure: The IUT does not return a correct response datagram.

**TEST 248: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY SMALL,
----- OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a loose source option specified with an illegally small length.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one loose source option specified with an option length smaller than 7. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested loose source option.

**TEST 249: REFUSAL TO SEND DATAGRAM WITH INVALIDLY LARGE
----- LOOSE SOURCE OPTION LENGTH**

Determine that the IUT will refuse to send a datagram containing a loose source option specified with an option length greater than the maximum header length will allow.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one loose source option specified with an option length greater than 40. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested loose source option.

**TEST 250: REFUSAL TO SEND DATAGRAM WITH ILLEGALLY SMALL
----- LOOSE SOURCE POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a loose source option specified with a pointer value smaller than the option legally allows.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one loose source option specified with a pointer value less than 4. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested loose source option.

**TEST 251: REFUSAL TO SEND DATAGRAM WITH AN INVALID LOOSE
----- SOURCE POINTER VALUE**

Determine that the IUT will refuse to send a datagram containing a loose source option specified with an invalid pointer value.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one loose source option specified with a pointer value greater than the first routing field. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested loose source option.

**TEST 252: RECOGNITION THAT LOOSE SOURCE OPTION REQUIRES COPY
----- FLAG**

Determine that the IUT will refuse to send a datagram containing a loose source option specified without a copy flag.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing one loose source option specified with no copy flag. All other fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the requested loose source option.

TEST 253: REFUSAL TO SEND DATAGRAM WITH TWO LOOSE SOURCE OPTIONS

Determine that the IUT recognizes that datagram should contain only one loose source record option.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing two loose source options. All fields will be valid fields.

- Verification: The IUT should return a response datagram with the message "error" or "notimpl".

- Success: The IUT does return a response datagram with the message "error" or "notimpl".

- Failure: The IUT returns a response datagram with the two requested loose source options.

Scenario TOPDOWN_OPTIONS

This scenario tests whether the Implementation Under Test (IUT) can send datagrams with a combination of correct options.

TEST 254: SENDING OF TWO OPTIONS

Determine that the IUT will send a datagram containing two valid options.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing two valid options to the REF. All datagram fields will be valid fields.
- Verification: The IUT should return the datagram requested.
- Success: The IUT returns either: a response datagram containing the requested options; a datagram containing an option and the message "notimpl"; or the message "notimpl".
- Failure: The IUT does not return a correct response datagram.

TEST 255: SENDING OF THREE OPTIONS

Determine that the IUT will send a datagram containing three valid options.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing three valid options to the REF. All datagram fields will be valid fields.
- Verification: The IUT should return the datagram requested.
- Success: The IUT returns a response datagram containing either: the requested options; a datagram containing one or more options and the message "notimpl"; or the message "notimpl".
- Failure: The IUT does not return a correct response datagram.

TEST 256: SENDING OF MULTIPLE OPTIONS

Determine that the IUT will send a datagram containing more than three valid options.

- Action: The Central Driver (CD) will request the IUT to send a datagram containing five valid options to the REF. All datagram fields will be valid fields.

- Verification: The IUT should return the datagram requested.

- Success: The IUT returns a response datagram containing either: the requested options; a datagram containing one or more of the options and the message "notimpl"; or the message "notimpl".

- Failure: The IUT does not return a correct response datagram.

Scenario IP_ICMP

This scenario tests whether the Implementation Under Test (IUT) accepts Internet Control Message Protocol (ICMP) datagrams and will respond with an ICMP message when required.

TEST 300: ACCEPTANCE OF ICMP DESTINATION UNREACHABLE

Determine that the IUT will accept a Destination Unreachable ICMP message.

- Action: The Central Driver (CD) will send an ICMP Destination Unreachable message. It will then send an IP datagram with default values. All fields sent will be valid fields.

- Verification: The IUT should return a response datagram for the IP datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram. This would indicate that the ICMP message caused a problem to the IUT.

TEST 301: SENDING OF ICMP DESTINATION UNREACHABLE

Determine if the IUT will send a Destination Unreachable ICMP message .

- Action: The Central Driver (CD) will send the IUT a datagram with an unassigned protocol number. It will then send a IP datagram with default values. All fields sent will be valid fields except for the protocol field in the first datagram.

- Verification: Determine if the IUT returns a Destination Unreachable - protocol unreachable - ICMP message.

- Success: The IUT returns a Destination Unreachable message with the protocol unreachable code.

- Failure: The IUT returns a Destination Unreachable message with the wrong reason code.

- Observation: The IUT does not send Destination Unreachable ICMP messages for protocol unreachable.

TEST 302: ACCEPTANCE OF ICMP TIME EXCEEDED MESSAGE

Determine that the IUT will accept a Time Exceeded ICMP message.

- Action: The Central Driver (CD) will send an ICMP Time Exceeded message. It will then send an IP datagram with default values. All fields sent will be valid fields.

- Verification: The IUT should return a response datagram for the IP datagram.

- Success: The IUT returns a response datagram.

- Failure: The IUT does not return a response datagram. This would indicate that the ICMP message caused a problem to the IUT.

TEST 303: SENDING OF ICMP TIME EXCEEDED MESSAGE

Determine if the IUT will send a Time Exceeded ICMP message.

- Action: The Central Driver (CD) will send the IUT a datagram with a time to live of 0. All fields sent will be valid fields.

- Verification: Determine if the IUT returns a Time Exceeded ICMP message.

- Success: The IUT returns a Time Exceeded message with a code of 0.

- Failure: The IUT returns a Time Exceeded message with the wrong reason code.

- Observation: The IUT does not send Time Exceeded message when a time to live expires on a datagram.

**TEST 304: SENDING OF ICMP TIME EXCEEDED MESSAGE DURING
FRAGMENT REASSEMBLY**

Determine if the IUT will send a Time Exceeded ICMP message when time expires during a fragmented datagram's reassembly.

- Action: The Central Driver (CD) will send the IUT the first fragment of a datagram with a time to live of 2. After waiting 5 seconds, the CD will send a correct default datagram. All fields sent will be valid fields.

- Verification: Determine if the IUT returns a Time Exceeded ICMP message with a code of 1.
- Success: The IUT returns a Time Exceeded message with a code of 1.
- Failure: The IUT returns a Time Exceeded message with the wrong reason code.
- Observation: The IUT does not send Time Exceeded message when a time to live expires during datagram reassembly.

TEST 305: ACCEPTANCE OF ICMP PARAMETER PROBLEM MESSAGE

Determine if the IUT will accept an ICMP Parameter Problem message.

- Action: The Central Driver (CD) will send the IUT an ICMP parameter problem message. Then the CD will send a valid datagram. All fields sent will be valid fields.

- Verification: Determine if the returns the response to the valid datagram.

- Success: The IUT returns a response to the valid datagram.

- Failure: The IUT does not return the response to the valid datagram indicating that the ICMP message caused a problem for the IUT.

TEST 306: SENDING OF ICMP PARAMETER PROBLEM MESSAGE

Determine if the IUT will send a Parameter Problem ICMP message when a datagram is received with an incorrect parameter.

- Action: The Central Driver (CD) will send the IUT a datagram containing an unassigned option. Then the CD will send a valid datagram. All fields sent will be valid fields except the option type.

- Verification: Determine if the IUT returns a Parameter Problem ICMP message with a correct pointer value.

- Success: The IUT returns a Parameter Problem message with the correct pointer value.

- Failure: The IUT returns a Parameter Problem message with a wrong pointer value.

- Observation: The IUT does not send a Parameter Problem message when it received a message with an incorrect parameter.

TEST 307: ACCEPTANCE OF ICMP REDIRECT MESSAGE

Determine if the IUT will accept an ICMP Redirect message.

- Action: The Central Driver (CD) will send the IUT an ICMP redirect message. This will be a redirect message for another source. It will redirect data to that source to the reference host. Then the CD will send a datagram with the source address the source address in the redirect message. All fields sent will be valid fields. Then the CD will send a datagram with the default values.

- Verification: Determine if the IUT returns the response to the datagram sent with the redirected source and the valid datagram.

- Success: The IUT returns a response to the redirected datagram indicating that the redirect was successful.

- Failure: The IUT does not return the response to the valid datagram which indicates that the ICMP message caused a problem for the IUT.

- Observation: The IUT returns the response to the valid datagram only. This indicates that the IUT accepted the ICMP redirect message but does not implement the change.

TEST 308: ACCEPTANCE OF ICMP TIMESTAMP RESPONSE MESSAGE

Determine if the IUT will accept an ICMP Timestamp message.

- Action: The Central Driver (CD) will send the IUT an ICMP Timestamp message. Then the CD will send a valid datagram. All fields sent will be valid fields.

- Verification: Determine if the IUT returns the response to the valid datagram.

- Success: The IUT returns a response to the valid datagram indicating that the timestamp message was accepted without problem.

- Failure: The IUT does not return the response to the valid datagram which indicates that the ICMP message caused a problem for the IUT.

**TEST 309: ACCEPTANCE OF ICMP TIMESTAMP REQUEST AND SENDING OF
----- TIMESTAMP REPLY**

Determine if the IUT will accept an ICMP Timestamp Request and return an ICMP Timestamp Reply message.

- Action: The Central Driver (CD) will send the IUT the ICMP Timestamp Request Message. Then the CD will send a valid datagram. All fields sent will be valid fields.

- Verification: Determine if the IUT returns a correct Timestamp Reply message.

- Success: The IUT returns a Timestamp Reply message with the fields correctly filled.

- Failure: The IUT returns a Timestamp Reply message with a wrong code or the time fields not filled. A second reason for failure is when the IUT does not return the response to the good default datagram. This indicates that the Timestamp Request message caused a problem.

- Observation: The IUT does not return a reply to the Timestamp Request ICMP message.

**TEST 310: ACCEPTANCE OF ICMP ECHO RESPONSE MESSAGE
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Determine if the IUT will accept an ICMP Echo Reply message.

- Action: The Central Driver (CD) will send the IUT an ICMP Echo Reply message. Then the CD will send a valid datagram. All fields sent will be valid fields.

- Verification: Determine if the IUT returns the response to the valid datagram.

- Success: The IUT returns a response to the valid datagram indicating that the Echo Reply ICMP message was accepted without problem.

- Failure: The IUT does not return the response to the valid datagram which indicates that the ICMP Echo Reply message caused a problem for the IUT.

TEST 311: ACCEPTANCE OF ICMP ECHO REQUEST AND SENDING OF REPLY

Determine if the IUT will accept an ICMP Echo Request and return an ICMP Echo Reply message.

- Action: The Central Driver (CD) will send the IUT the ICMP Echo Request Message. Then the CD will send a valid datagram. All fields sent will be valid fields.
- Verification: Determine if the IUT returns a correct Echo Reply message.
- Success: The IUT returns a Echo Reply message.
- Failure: The IUT returns a response Echo message with a wrong code. A second reason for failure is when the IUT does not return the response to the good default datagram. This indicates that the Echo Request message caused a problem.
- Observation: The IUT does not return a reply to the Echo Request ICMP message.

TEST 312: RECOGNITION OF INVALID CKSUM ON ICMP MESSAGE

Determine if the IUT will accept an ICMP Message when the message checksum is incorrect. This test will only be run if the IUT returns an Echo Reply to an Echo Request ICMP message.

- Action: The Central Driver (CD) will send the IUT the ICMP Echo Request Message with an incorrect ICMP checksum. Then the CD will send a valid datagram. All fields sent will be valid fields except the ICMP checksum.
- Verification: Determine if the IUT drops the ICMP message.
- Success: The IUT does not return an Echo Reply message.
- Failure: The IUT returns an Echo Reply. A second reason for failure is when the IUT does not return the response to the good default datagram. This indicates that the Echo Request message caused a problem.

TEST 313: ACCEPTANCE OF ICMP INFO REPLY MESSAGE

Determine if the IUT will accept an ICMP Information Reply message.

- Action: The Central Driver (CD) will send the IUT an ICMP Information Reply message. Then the CD will send a valid datagram. All fields sent will be valid fields.

- Verification: Determine if the IUT returns the response to the valid datagram.

- Success: The IUT returns a response to the valid datagram indicating that the the Information Reply ICMP message was accepted without problem.

- Failure: The IUT does not return the response to the valid datagram. This indicates that the ICMP Information Reply message caused a problem for the IUT.

TEST 314: ACCEPTANCE OF ICMP INFO REQUEST AND SENDING OF REPLY

Determine if the IUT will accept an ICMP Information Request and return an ICMP Information Reply message.

- Action: The Central Driver (CD) will send the IUT the ICMP Information Request Message. Then the CD will send a valid datagram. All fields sent will be valid fields.

- Verification: Determine if the IUT returns a correct Information Reply message.

- Success: The IUT returns an Information Reply message.

- Failure: The IUT returns a response Information message with a wrong code. A second reason for failure is when the IUT does not return the response to the good default datagram. This indicates that the Information Request message caused a problem.

- Observation: The IUT does not return a reply to the Information Request ICMP message.

**TEST 315: ACCEPTANCE OF ICMP INFO REQUEST AND SENDING OF REPLY
----- FOR NETWORK ADDRESS**

Determine if the IUT will accept an ICMP Information Request and return an ICMP Information Reply message giving the current network address. This test will only be run if test 311 is successful.

- Action: The Central Driver (CD) will send the IUT the ICMP Information Request Message with the network parameter of the source address and the destination address set to 0. Then the CD will send a valid datagram. All fields sent will be valid fields.

- Verification: Determine if the IUT returns a correct Information Reply message giving the network address.

- Success: The IUT returns an Information Reply message set with the correct network address.

- Failure: The IUT returns a response Information message without updating the network address field. Another reason for failure is that the IUT does not return the response to the good default datagram, indicating that the Information Request message caused a problem.

- Observation: The IUT does not return a reply to the Information Request ICMP message.

**TEST 316: ACCEPTANCE OF ICMP SOURCE QUENCH
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Determine if the IUT will accept an ICMP Source Quench.

- Action: The Central Driver (CD) will send the IUT the ICMP Source Quench Message. The CD will then send a correct datagram to the IUT. All fields sent will be valid fields.

- Verification: Determine if the IUT returns a response to the datagram sent by the CD.

- Success: The IUT returns the response datagram required by the correct datagram sent by the CD. This indicates that the IUT accepted the Source Quench without adverse effect.

- Failure: The IUT does not return the response datagram required by the datagram sent to the IUT. This indicates that the Source Quench message cause a problem to the IUT.

TEST 317: SENDING OF ICMP SOURCE QUENCH

Determine if the IUT will send an ICMP Source Quench.

- Action: The Central Driver (CD) will send the IUT a series of datagrams in a continuous fashion to try to force the IUT to respond with an ICMP Source Quench Message. Each of these datagrams will have an error that will cause them to be dropped. Finally, the CD will send a correct datagram to the IUT. All fields in this datagram will be valid fields.

- Verification: Determine if the IUT returns an ICMP Source Quench message.

- Success: The IUT returns the Source Quench ICMP message.

- Failure: The IUT does not return a correct response datagram for the correct datagram that was sent. This indicate that the IUT had a problem processing the prior datagrams.

- Observation: Unable to force the IUT to return a Source Quench message.